

REVIEW OF *THRIPS HAWAIIENSIS* AND REVALIDATION OF
T. FLORUM (THYSANOPTERA: THIRIPIDAE)

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Abstract. — *Thrips florum* Schmutz, previously synonymized under *T. hawaiiensis* (Morgan), is revalidated (Rev. Status). Six other names also synonymized previously under *hawaiiensis* are treated here as junior synonyms of *florum*. Characters to differentiate *florum* from *hawaiiensis* are given and variation in both species is discussed. Synonyms and general distribution for both species are presented and a lectotype is designated for *hawaiiensis*.

Thrips hawaiiensis (Morgan) is currently considered a variable species in morphology and color and, consequently, many species were synonymized with it (Jacot-Guillarmod, 1975; Bhatti, 1980). One of the variable morphological characters is the number of antennal segments. According to K. Sakimura (1980, pers. comm.), 62% of 345 specimens of *hawaiiensis* he examined from Hawaii had 8-segmented antennae, 20% had 8 segments on one side and 7 segments on the other, and 18% had only 7-segmented antennae. Most specimens examined by Bhatti (1980) from India had 7-segmented antennae. Specimens examined thus far from southeastern United States have 8-segmented antennae, except for two specimens from Florida with 7-segmented antennae. The number of antennal segments was the major criterion used previously to differentiate *Thrips* (7-segmented) from *Taeniothrips* (8-segmented). Consequently this species was assigned to both genera. To rectify this problem in this and other species, the concepts of both genera were recently revised by Bhatti (1978).

Thrips hawaiiensis is frequently intercepted by agricultural quarantine inspectors in cut flowers at ports of entry. During the past 15 years I have observed that many lots from the Orient and South Pacific islands consisted of females with only 7-segmented antennae, dark brown bodies, and long posteroangular setae on the pronotum. Other lots consisted of females with only 8, 7 and 8, or 7-segmented antennae, paler head and thorax and shorter posteroangular setae. Moreover, the males of these two forms also differed morphologically. Because the first form has not been found in conterminous United States, this study was initiated to find out if *hawaiiensis* as currently recognized consists of more than one species.

METHODS AND RESULTS

The types of *hawaiiensis* and about half of its synonyms were examined. Only female types were available. Identified lots with females and males, and lots with only females or males were also examined. Based on 12 lots with females and

males, I conclude that the current concept of *hawaiiensis* includes two different species, *hawaiiensis* and *florum* Schmutz. The latter species (5 lots, 24 females, 11 males) usually has 7-segmented antennae, rarely with one of the two antennae 8-segmented; females have (1) brown to dark brown bodies with orange subintegumental pigmentation in the thorax and head; (2) pronotum with posteroangular setae relatively long, 66–85 (avg. 76) μm ; (3) 8–12 accessory setae on abdominal sternite VII; (4) and antero-angulated area of mesonotum lack striations by the anterior pores (Fig. 1). Males have (5) outer posteroangular setae 54–73 (avg. 62) μm long, inner pair 59–68 (avg. 65) μm long; and (6) 4 posterior setae on abdominal tergite IX with mesal pair longer and often stouter than lateral pair, distance between mesal setae 3.0–5.6 times the distance between the mesal and lateral setae (Fig. 3). Conversely, *hawaiiensis* (7 lots, 27 females, 20 males) has usually 8-segmented antennae, less frequently with one of the two antennae 7-segmented or both antennae 7-segmented. Females (1) with brown abdomen, thorax and head yellow, yellowish orange or brown with orange subintegumental pigmentation; (2) pronotum with shorter posteroangular setae, 33–62 (avg. 45) μm long; (3) abdominal sternite VII with 13–19 accessory setae; (4) and antero-angulated area of mesonotum striated by the anterior pores (Fig. 2). Males have (5) outer posteroangular setae 30–50 (avg. 38) μm long, inner pair 33–62 (avg. 45) μm long; and (6) abdominal tergite IX with 4 similar, bristle-like posterior setae, mesal pair usually longer than lateral pair, distance between mesal setae 1.0–1.8 times the distance between the mesal seta and lateral seta (Fig. 4). In other material, the coloration and the range of variation for characters 1–3 of the two species overlap. However, characters 4 and 6 are different, and character 3 apparently overlaps by one seta. Unfortunately, character 4, the presence or absence of striations on the anterior angulated area of the mesonotum, can be seen distinctly only on cleared specimens that do not have the pronotum lying over the anterior part of the mesonotum.

DISCUSSION

Thrips hawaiiensis is more variable than *florum*. The types of *hawaiiensis* have posteroangular setae that are 42–55 μm long and 13 accessory setae on sternite VII. One specimen from Australia has 76 μm long posteroangular setae, and Sakimura (pers. comm.) has seen a specimen from Hawaii that has 82 μm long posteroangular setae. Some specimens from India resemble *florum* in color and have relatively long posteroangular setae, 54–78 μm long, rarely as long as 86 μm , but have 15–23 accessory setae on abdominal sternite VII.

Thrips florum Schmutz previously treated as a junior synonym of *hawaiiensis* (Jacot-Guillarmod, 1975; Bhatti, 1978) is revalidated (Revised Status). Two paratotypes of *florum* have outer posteroangular setae 78–87 μm long, and inner pair 71–85 μm long. Some of the types of the following species synonymized here under *florum* are in poor condition; however, I was able to see 11 accessory setae on sternite VII of *magnipes* Schmutz, *pallida* Schmutz and *rhodamniae* Schmutz; *magnipes* Schmutz has outer posteroangular setae 80–85 μm long, inner pair 76–80 μm long; *exilicornis* Hood has posteroangular setae 76–94 μm long and 10–13 accessory setae on sternite VII; and *florum* var. *dunbariae* have outer posteroangular setae 66–86 μm long, inner pair 73 μm long, and 10–11 accessory setae on sternite VII. According to Priesner (1934), *florum* var. *dunbariae* Priesner has

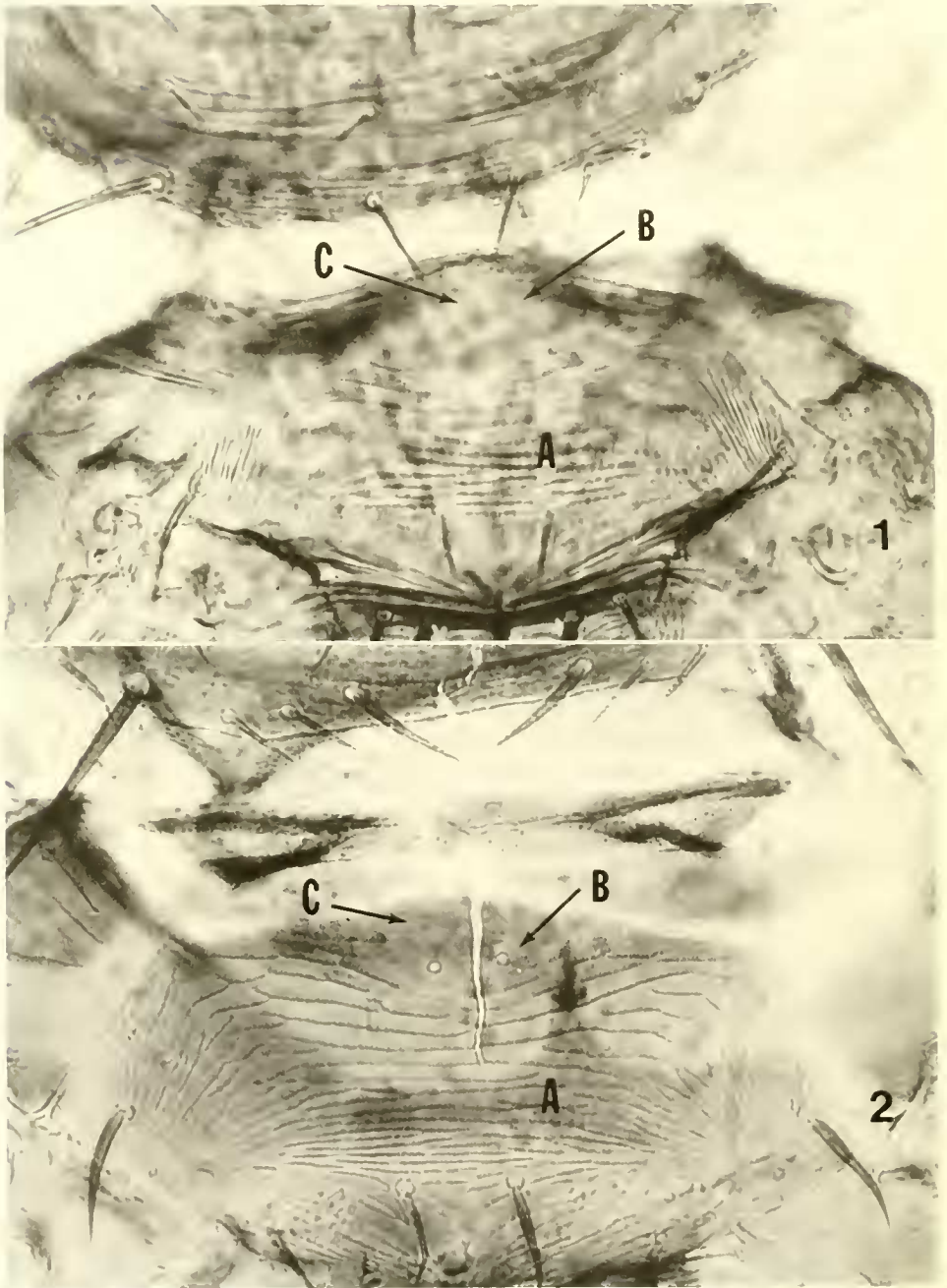
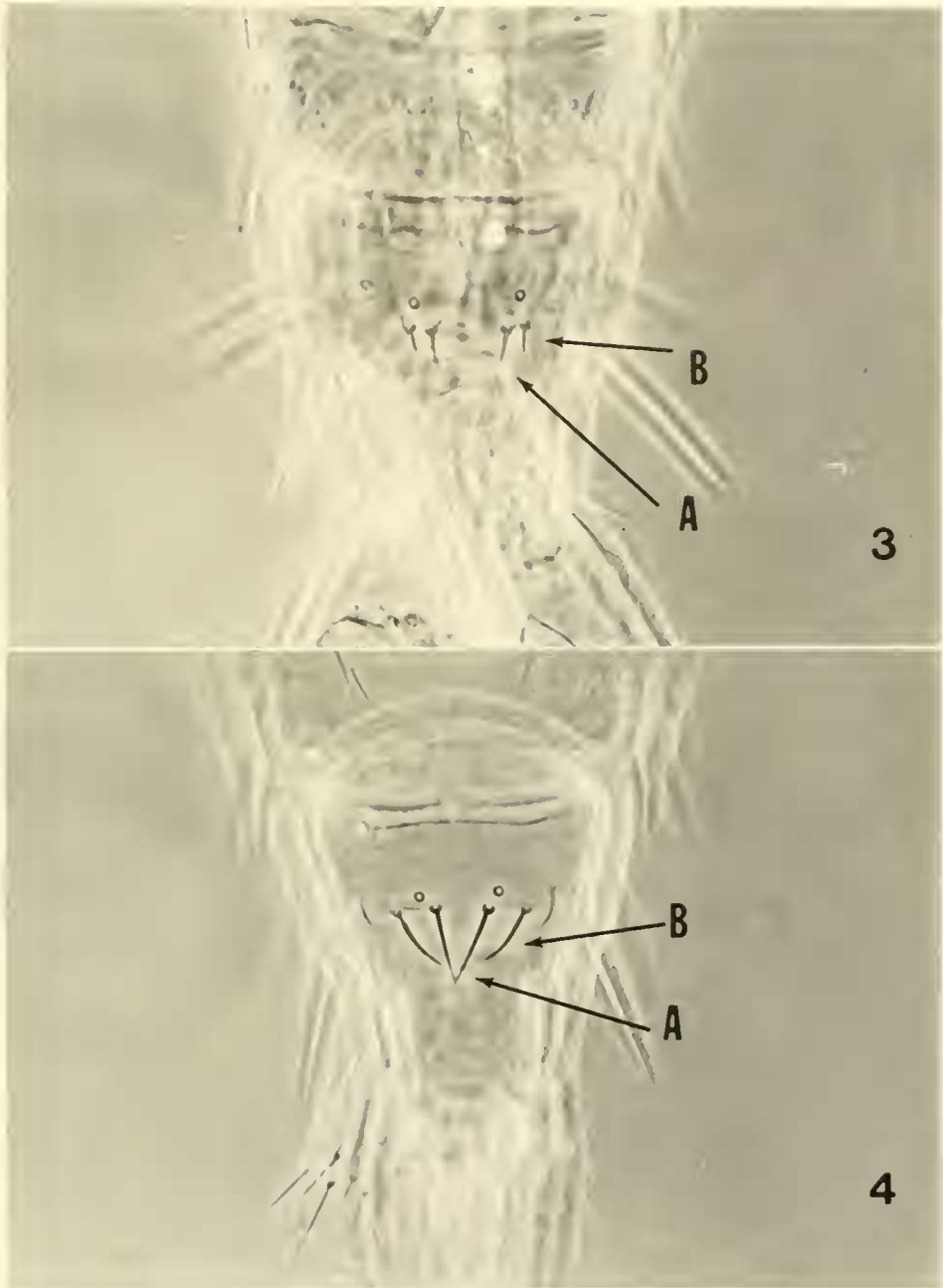


Fig. 1, 2. Female mesonota. 1, *Thrips florum*. 2, *Thrips hawaiiensis*. A, mesonotum; B, anterior pore; C, striations (lacking in Fig. 1).

4–5 pairs of accessory setae on sternite IV and *florum* has 6–10 pairs of accessory setae on the same sternite; however, in the *dunbariae* material, two specimens had 10 and 13 setae on sternite IV.

Three females from Singapore compared with the types of *florum* by Priesner,



Figs. 3, 4. Posterior setae on abdominal tergite IX. 3, *Thrips florum* male. A, mesal seta; B, lateral seta. 4, *Thrips hawaiiensis* male. A, mesal seta; B, lateral seta.

and four females from Peradenya, Ceylon and two females from Kuala Lumpur, Malaysia identified by Priesner as *florum* have posteroangular setae and accessory setae in range of variation for *florum*. Other females from South Pacific Islands, Philippines, and Thailand also agree with the concept of *florum*. In all examined

specimens on which the anterior part of the mesonotum was clearly visible, striations were lacking from the anterior angulated area by the anterior pores.

Acronyms for the depositories of the material examined are: CAS = California Academy of Sciences, San Francisco; NHMV = Naturhistorisches Museum, Vienna, Austria; SMF = Naturmuseum und Forschungsinstitut Senckenberg, Frankfurt, West Germany; USNM = United States National Museum of Natural History, Beltsville, MD.

***Thrips hawaiiensis* (Morgan)**

Euthrips hawaiiensis Morgan, 1913.

Thrips longalata Schmutz, 1913.

Thrips sulphurea Schmutz, 1913.

Thrips nigriflava Schmutz, 1913.

Thrips albipes Bagnall, 1914.

Physothrips pallipes Bagnall, 1916.

Thrips versicolor Bagnall, 1926.

Taeniothrips hawaiiensis (Morgan): Moulton, 1928a.

Taeniothrips eriobotryae Moulton, 1928b.

Thrips hawaiiensis form *imitator*, Priesner 1934.

Taeniothrips rhodomytri Priesner, 1938.

Taeniothrips pallipes var. *florinatus* Priesner, 1938.

Thrips hawaiiensis (Morgan): Priesner, 1934; Jacot-Guillarmod, 1975; Bhatti, 1980. *Thrips leucaenae* Moulton, synonymized by Jacot-Guillarmod (1975) with *hawaiiensis*, was recently treated as a junior synonym of *sumatrensis* Priesner by Bhatti (1980). *Thrips florum* Schmutz and other species treated in this study as junior synonyms of *florum* were previously treated as synonyms of *hawaiiensis* by various thysanopterists. *Thrips longalata*, *sulphurea*, and *nigri-flava* are possibly junior synonyms of *florum* but, because the types were not available to me for study, I have followed Jacot-Guillarmod (1975) and Bhatti (1980) in treating these species as synonyms of *hawaiiensis*. *Thrips exilicornis* Hood, recently treated by Bhatti (1980) as a junior synonym of *hawaiiensis*, is here considered a junior synonym of *florum*.

Type material examined.—Lectotype and 1 paralectotype of *T. hawaiiensis* mounted on same slide labeled on left: *Thrips* sp.?, det. Pergande; see let. D. T. Fullaway, Feb. 6, 09, Honolulu, H. I.; right label: *Thrips*, cotton, Fullaway, Aug. 08; label on back of slide on right: *Thrips hawaiiensis* (Morgan), LECTOTYPE (larger and darker specimen) designated by S. Nakahara (USNM). *Thrips albipes* Bagnall (co-type) (USNM), *Physothrips pallipes* Bagnall (co-type) (USNM).

Other material examined: 7 lots with ♀ and ♂: Hawaii 4 ♀, 6 ♂; Georgia 6 ♀, 5 ♂; Japan 7 ♀, 2 ♂; New Zealand 3 ♀, 1 ♂; Okinawa 1 ♀, 2 ♂; Philippines 2 ♀, 2 ♂; India 4 ♀, 2 ♂. Many other unassociated ♀ and ♂ from Hawaii, Orient and India (CAS, USNM). The ♀ and ♂ examined from Georgia were from different collections. However, only the 8-segmented antennal form has been examined from Georgia and the specimens represent one species.

This species feeds primarily in the inflorescence of various plants. It is a pest of various agricultural crops in India (Ananthakrishnan, 1984), and a pest of roses in the state of Georgia (Beshear, 1985, pers. comm.). This thrips is widely dis-

tributed in the Orient and Pacific Islands; in North America, it is recorded from California, Florida, Georgia, South Carolina, Texas, and District of Columbia.

Thrips florum Schmutz, REVISED STATUS

Thrips florum Schmutz, 1913.

Thrips parva Schmutz, 1913.

Thrips magnipes Schmutz, 1913.

Thrips rhodamniae Schmutz, 1913.

Thrips pallida Schmutz, 1913.

Thrips peradenyae Schmutz, 1913 (probably replacement name for *T. pallida* (Bhatti, 1980)).

Thrips florum var. *dunbariae* Priesner, 1924.

Thrips exilicornis Hood, 1932.

Type material examined.—2 paralectotypes of *T. florum*; Ceylon, Peradenya, 19 Dec. 1901, Ciramonum-Bluten, leg. Uzel No. 29 (NHMV). 2 paralectotypes of *Thrips magnipes* Schmutz; Ceylon, Peradenya, 18 Dec. 1901, *Clerodendron fragrans*, leg. Uzel No. 30 (NHMV). Lectotype of *Thrips parva* Schmutz; Ceylon, Peradenya, 19, Dec. 1901, Ciramonum Blumen, leg. Uzel No. 29 (NHMV). 1 paralectotype of *Thrips rhodamniae* Schmutz; Ceylon, Peradenya, 22 Dec. 1901, *Rhodamnia trinervis*, leg. Uzel No. 41 (NHMV). 2 paralectotypes of *Thrips pallida* Schmutz; Ceylon, Peradenya, 31 Dec. 1901, Blumen von!, leg. Uzel No. 37 (NHMV). 8 paralectotypes of *Thrips florum* var. *dunbariae* Priesner, Java, Tjandi b. Semarang, 6-VII-1913, in *Bluten Dunbaria* spec., leg. Docter van Leeuwen (SMF). Holotype and 5 paratypes of *Thrips exilicornis* Hood, Ibadan, S. Nigeria, Jan. 14, 1915, flowers of *Melia azedarach*, A. W. Jobbins-Pomeroy (Hood no. 53) (USNM).

Other material examined: 5 lots with ♀ and ♂: Solomon Arch. 2 ♀, 1 ♂ (SMF); Ceylon (Peradenya) 9 ♀, 1 ♂; India (2 localities) 12 ♀, 8 ♂; origin unknown 1 ♀, 1 ♂. Many ♀ from South Pacific islands, Philippines and Thailand (CAS, USNM).

The primary reason for selecting *florum* over other available Schmutz (1913) names is based on the comparison of a lot (9 females, 1 male) from Peradenya, Ceylon with two female paralectotypes of *florum*, which was described from Peradenya. Moreover, *florum* is the oldest available name of the *Thrips* species described by Schmutz in 1913. Six other species previously treated as junior synonyms of *hawaiiensis* are treated here as synonyms of *florum*.

Because *florum* has been misidentified as *hawaiiensis*, some of the pest problems attributed to *hawaiiensis* may have been caused by *florum*. Although this species is currently known from the Orient, Pacific Islands and Nigeria, the correct distribution can be ascertained only by examining the past determinations of *hawaiiensis*.

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